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PROCEEDINGS OF THE ASSOCIATION

OF

COUNTY SURVEYORS

AND

CIVIL ENGINEERS

OF THE

STATE OF INDIANA,

AT ITS

SECOND ANNUAL MEETING,

HELD IN

INDIANAPOLIS, JANUARY 17TH AND 18TH, 1882.

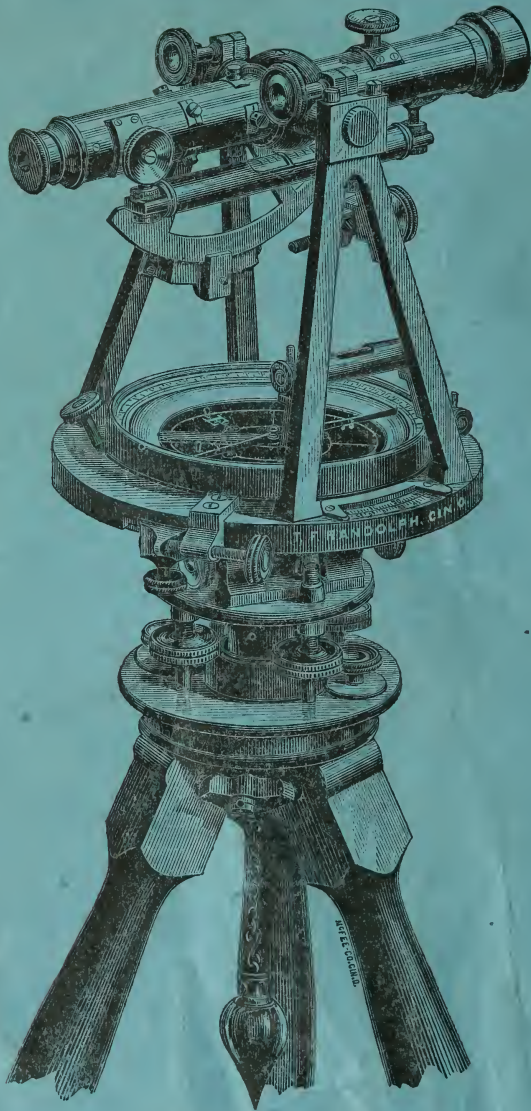
TOGETHER WITH THE

Constitution and By-Laws, Registered Members, Etc.

INDIANAPOLIS:

WM. B. BURFORD, PRINTER, LITHOGRAPHER AND STATIONER.

1882.



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## P R E F A C E .

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*To the Members of the Association of County Surveyors and Civil Engineers of the State of Indiana:*

The Committee herewith present a report of the Second Annual Meeting of the Surveyors' Association, held in accordance with our by-laws, at Indianapolis, and opening on the afternoon of January 17, 1882.

Every precaution had been taken by the officers and members to insure a full attendance. Many of the County Surveyors of the State were present, and several others sent letters expressive of interest in the Association.

To those of you who were not able to be present, we desire to say, that all possible pains will be taken to insure to you all the advantages of our union that the nature of the case renders possible, in the way of reports, instruction and information; but, we desire especially to call your attention to the pleasure and profit resulting from a personal intercourse, even if limited in extent, with friends and brothers of like thoughts, desires and intentions with your own, and could you recognize its value and significance as clearly as do those who were in attendance, we are assured that nothing but illness would prevent your appearance in January, 1883.

Copies of this report will be sent to any address that members may forward to the Corresponding Secretary, and in return we beg of you such aid and assistance in carrying on our work as your position and advantages render feasible.

Respectfully submitted by

P. A. T. 2

COMMITTEE.

# ASSOCIATION OF COUNTY SURVEYORS

OF THE

STATE OF INDIANA.

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## OFFICERS. 1882.

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WALTER A. OSMER, <i>President</i> . . . . .	LOGANSPORT.
P. C. VAWTER, <i>Vice President</i> . . . . .	LAFAYETTE.
JOHN B. MALOTT, <i>Recording Secretary</i> . . . . .	BEDFORD.
H. B. FATOUT, <i>Corresponding Secretary</i> . . . . .	INDIANAPOLIS.
ISAIAH PLATT, <i>Treasurer</i> . . . . .	INDIANAPOLIS.

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## COMMITTEES.

### *EXECUTIVE COMMITTEE.*

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H. B. FATOUT . . . . .	INDIANAPOLIS.
J. B. MALOTT . . . . .	BEDFORD.
ROBERT I. MORRISON . . . . .	KNIGHTSTOWN.
L. S. ALTER . . . . .	JASPER.
IRA McCONNEL . . . . .	CRAWFORDSVILLE.

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### *COMMITTEE ON PRINTING.*

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ISAIAH PLATT . . . . .	INDIANAPOLIS.
H. B. FATOUT . . . . .	INDIANAPOLIS.
J. B. MALOTT . . . . .	BEDFORD.
J. C. PULSE . . . . .	GREENSBURG.



# CONSTITUTION.

## ARTICLE I.

This organization shall be known as the ASSOCIATION OF COUNTY SURVEYORS AND CIVIL ENGINEERS OF THE STATE OF INDIANA.

## ARTICLE II.

Its objects shall be for mutual benefit and for the advancement of the profession.

## ARTICLE III.

Its officers shall consist of a President, Vice President, Recording Secretary, Corresponding Secretary, Treasurer and Executive Committee of five members.

## ARTICLE IV.

The duties of these officers shall be the same as those of like associations.

## ARTICLE V.

All County Surveyors and Deputy County Surveyors and Civil Engineers of the State of Indiana may become members, upon recommendation of the Executive Committee, and the payment of an initiation fee of one dollar, and signing the Constitution and By-Laws.

## BY-LAWS.

SECTION 1. This Association shall meet annually, at the city of Indianapolis, on the third Tuesday of January. The meeting to be called to order at 2 o'clock, p. m.

SEC. 2. The officers of this Association shall be elected by ballot, on the morning of the second day of each annual meeting; officers elected to assume their respective duties immediately after election.

SEC. 3. It shall be the duty of the Executive Committee to provide a room for the meeting, and the Corresponding Secretary to give twenty days notice of said meeting to the members and County Surveyors of the State of Indiana.

SEC. 4. Each member shall pay an annual membership fee of (\$1.00) one dollar to the Treasurer, at each regular meeting after becoming a member of the Association.

SEC. 5. The Treasurer shall pay only such bills as are approved by the Executive Committee.

SEC. 6. No member shall be allowed to speak more than twice upon the same subject, unless by consent of a majority of the members present, and the Association in its business transactions shall be governed by Cushing's Manual.

SEC. 7. The President shall have power to call an extra session when required by the Executive Committee.

SEC. 8. One-fourth of the number of registered members shall constitute a quorum for business at any regular or called meeting.

### SUPPLEMENTARY CLAUSE.

ARTICLE I. The Constitution may be altered or amended at any regular meeting, by a two-thirds vote of the members present.

ARTICLE II. The By-laws may be altered or amended at any regular meeting by a majority of the votes of the members attending.



MINUTES OF THE SECOND ANNUAL MEETING  
OF THE  
Association of County Surveyors and Civil Engineers,  
OF THE  
STATE OF INDIANA,  
HELD IN THE  
SURVEYOR'S OFFICE, MARION COUNTY, INDIANAPOLIS,  
*January 17th, and 18th, 1882.*

*Surveyor's Office, Indianapolis, January 17th, 1882:*

Pursuant to the call of the Corresponding Secretary. The Association assembled in the Surveyor's office of Marion county at 2 p. m. Called to order by the President, W. A. Osmer. Calling of the roll by the Secretary showed a quorum present for business. Reading of the journal of previous meeting and approved. The President then delivered the opening address, plainly setting forth the duties and work for the present session.

The Secretary then read communications from absent members, Chas. W. Webster of Shelby county, E. P. Wiles of Ohio county, R. H. Walls, Putnam county, and M. H. Buskirk, Monroe county, expressing regrets for forced absence, wishing

the Association a grand and successful meeting, expecting progressive work and ideas to result therefrom.

The Executive Committee, recommended through their Secretary the names of R. R. Spencer of Rush county, E. P. Wiles of Ohio county for membership, and their names were ordered recorded. The Association then ordered the books opened for signatures of new members, resulting in the names of the following signing Constitution and By-Laws: L. B. Root, Goshen, Elkhart county; J. B. Malott, Bedford, Lawrence county; P. C. Vawter, Lafayette, Tippecanoe county; S. J. Miller, Rochester, Fulton county; C. F. S. Neal, Lebanon, Boone county.

On motion of Mr. Fatout Section 2 of By-Laws was amended to read as follows:

“The officers of this Association shall be elected by ballot, on the morning of the second day of each annual meeting. Officers elected to assume their respective duties immediately after election.”

The Association then called for the reading by the Secretary of a paper, subject, “About corners,” read before the Michigan Association by Francis Hodgman of Kalamazoo county, Michigan.

Discussion opened by L. S. Alder of Brown county, followed by Leach, Morrison, Piatt and others, which matter was fully discussed.

D. A. Leach of Johnson county introduced a resolution respecting the death of President Garfield, referred to committee of three, Pulse, Malott and Root, committee.

On motion of Mr. Morrison, the Association adjourned to meet at 7:30 p. m.

#### Evening Session.

The Association assembled and was called to order at 7:30 p. m. by the President, who then introduced Judge Turpie, of Indianapolis, who delivered an address setting forth the duties and responsibilities of the profession.

On motion of Isaiah Piatt, a vote of thanks was tendered Judge Turpie for his very able and instructive address.

Isaiah Piatt, of the Land Department, State Auditor's office, favored the Association with a short and timely address, setting forth the disadvantage of the Surveyor and the paramount necessity of a head, created for such duties, where the Surveyor may have recourse for investigation.

On motion the Association adjourned to meet at 9 A. M.

## SECOND DAY.

### Morning Session.

*January 18, 1882.*

The Association met, pursuant to adjournment, with the President in the chair. Roll called. Minutes read and approved. Correspondence from Elwood Mead, of Switzerland, and Ira McConnel, of Montgomery, read and ordered on file by the Secretary.

The Treasurer being then called for, reported the receipts and expenditures for the fiscal year ending January 17, 1882, as follows:

Receipts for the year.....	\$37 00
Expenditures for the year.....	23 50
	<hr/>
Cash on hand.....	\$13 50

The report was received.

The Association then proceeded to the election of officers for the ensuing year, which resulted as follows:

*President*—W. A. Osmer, of Cass county.

*Vice President*—P. C. Vawter, Tippecanoe county.

*Recording Secretary*—J. B. Malott, Lawrence county.

*Corresponding Secretary*—H. B. Fatout, Marion county.

*Treasurer*—Isaiah Piatt, Lagrange county.

*Executive Committee*—Hervey B. Fatout, Indianapolis; John B. Malott, Bedford; Robert I. Morrison, Knightstown; Lewis S. Alter, Jasper; Ira McConnel, Crawfordsville.

On motion of Mr. Alter, Section 4, of the By-Laws was amended to read as follows: Each member shall pay an annual

membership fee of one dollar to the Treasurer at each regular meeting after becoming a member of the Association.

On motion of D. A. Leach, Messrs. Polk, Fatout, Piatt, Alter and Leach were appointed as a standing legislative committee.

On motion of Mr. Alter, a committee of three was appointed on order of business. Morrison, Root and Piatt, committee.

On motion of Mr. Leach, a committee of three was appointed on programme. Leach, Alter and Morrison, committee.

On motion of Mr. Morrison, Piatt, Fatout, Malott and Pulse were appointed committee on printing.

Isaiah Piatt, as chairman of committee to draft legal form for Surveyors' records, made his report and the committee was discharged.

On motion of Mr. Alter, committee on printing was instructed to have (500) five hundred copies of the proceedings of this convention printed and distributed as committee think proper.

On motion of Mr. Leach, the Association adjourned to meet at 1 o'clock P. M. sharp.

#### Afternoon Session.

The Association met pursuant to adjournment. Mr. Murray, of Marion, Grant county, met with the Association and favored us with some excellent and valuable remarks.

Report of Committee on Garfield Memorial Resolutions called for, J. C. Pulse, as chairman of committee submits the following:

WHEREAS, Since the last meeting of this Association, our Nation has a second time been cast down in grief by the assassination of the Chief Magistrate, the President of the United States; therefore, be it

*Resolved*, By this Association, that in the death of JAMES A. GARFIELD, the Nation has lost a Christian gentleman, an honored patriot and a noble President; the mother, a dutiful and loving son; the wife, a generous, affectionate and protecting husband; and the children a kind and indulgent father; and that we hereby express our sorrow and extend our sympathy and condolence to the family of the deceased, commending them and our country into the hands of a beneficent God, who is able to build up, cast down, and continue the destinies of Nations. Be it further

*Resolved*, That while we sadly feel our Nation's loss, yet we are thankful to know that our country still lives, and that the principles of freedom remain.

*Resolved*, That these resolutions be spread upon the records, and printed in the report of our proceedings.

JAMES C. PULSE, }  
 JOHN B. MALOTT, } Committee.  
 L. B. ROOT, }

#### REPORT OF COMMITTEES.

R. I. Morrison, Chairman of committee on order of business, reports that committee will be ready to report an order of business on morning of next regular meeting.

D. A. Leach as Chairman of committee on programme reports the following programme:

##### FIRST DAY.

*Evening Session*.—General business.

*Night Session*.—1. Responsibility of Surveyors. P. C. Vawter, Tippecanoe county. 2. Discussions. 3. General business.

##### SECOND DAY.

*Morning Session*.—1. Degree of Accuracy, William Truett, Delaware county. 2. Discussion. 3. General business.

*Evening Session*.—1. Laws pertaining to Surveyors and their duties, James C. Pulse, Decatur county. 2. Discussions. 3. General business.

##### THIRD DAY.

*Morning Session*.—1. Gravel Road, Ira McConnel, Montgomery county. 2. Discussion. 3. General business.

*Evening Session*. 1. Drainage, Walter A. Osmer, Cass county. 2. Discussion. 3. General business.

DAVID A. LEACH, }  
 LEWIS ALTER, } Committee.  
 ROBT. I. MORRISON, }

Discussion opened by L. B. Root on the subject of the Ditch Laws, followed by Mr. Morrison offering some valuable thoughts on the subject, giving his experience, and manner of working under the new Circuit Court law. Followed by Mr. Alter giving his experience on the subject with manner of working under the new law.

Mr. Murray responds giving some valuable thoughts on the subject, calling forth a reply from Mr. Piatt on the subject of main ditch, with reference to the intention of the Legislative body passing the law also with reference to parties responsible for assessment not immediately connected with the main ditch, which matter was fully discussed.

On motion of Mr. Piatt, books were opened to Capt. Jno. F. Campbell, of Indianapolis, for membership.

Captain Campbell made some remarks with reference to Surveyors' fees, and the collection of the same, which matter was fully discussed.

Mr. Morrison, of Henry county, read a very interesting paper on the subject of latitude and departure, giving some general and practical rules, making calculations easy to find minutes of angle, from links of departure for any given line, or, vice versa, from minutes of angle to find links of departure for any given line, demonstrating same.

On motion of Mr. Piatt, the address of Judge Turpie was ordered on file with the proceedings of the Association.

The following resolution was offered:

*Be it resolved,* That, in the opinion of this Association, and for the public good, the County Commissioners should furnish the Surveyors of their respective counties, who do not have them, a true and complete copy of the government field notes from the State Land Department, in accordance with certain duties described in the act of June 17, 1852.

Mr. Pulse made a few timely remarks for the good of the Association, after which a vote of thanks was tendered the retiring officers for their practical and efficient work.

The Association then had a recess of twenty minutes for the purpose of examining D. A. Leach's book on Abstracts of Titles, Stationery, etc., at expiration of which time the Association was again called to order and adjourned to meet at the call of the Corresponding Secretary.

JOHN B. MALOTT,

Recording Secretary.



## MEMBERS.

NAMES.	POST OFFICE.	COUNTY.
Alter, Lewis S.....	Jasper .....	Jasper.
Alder, Leon S.....	Nashville .....	Brown.
Brennan, Jas. H.....	Shoals .....	Martin.
Baker, J. E.....	Indianapolis.....	Marion.
Campbell, Jno. F.....	Indianapolis.....	Marion.
Clark, Jas. A.....	Hadley.....	Hendricks.
Cowan, R. G.....	Evansville .....	Vanderburg.
Fatout, H. B.....	Indianapolis.....	Marion.
Fries, M. S.....	Greenfield.....	Hancock.
Fries, William.....	Greenfield.....	Hancock.
Harris, Geo. W.....	Macksville .....	Vigo.
Leach, D. A.....	Franklin.....	Johnson.
Malott, Jno. B.....	Bedford.....	Lawrence.
Miller, S. J.....	Rochester .....	Fulton.
McComel, Ira.....	Crawfordsville.....	Montgomery.
Murry, E. C.....	Marion.....	Grant.
Morrison, Robt. L.....	Knightstown .....	Henry.
Neal, C. F. S.....	Lebanon .....	Boone.
Niles, E. P.....	Hartford.....	Ohio.
Osmer, Walter A.....	Logansport.....	Cass.
Piatt, Isaiah.....	Lagrange.....	Lagrange.
Parker, Francis M.....	Bloomfield.....	Green.
Pulse, Jas. C.....	Greensburg.....	Decatur.
Polk, Alex H.....	Princeton .....	Gibson.
Root, Lewis B.....	Goshen.....	Elkhart.
Shepard, Otis.....	Goodland.....	Newton.
Sanders, James .....	Westfield.....	Hamilton.
Smith, Levi.....	Bloomington.....	Parke.
Shea, James W.....	Wabash.....	Wabash.
Spencer, R. R.....	Clarksburgh.....	Rush.
Truitt, William.....	Muncie.....	Delaware.
Vawter, P. C.....	Lafayette.....	Tippecanoe.
Walls, R. H.....	Greencastle.....	Putnam.
Webster, Chas. Y.....	Shelbyville.....	Shelby.



## ADDRESS OF HON. DAVID TURPIE.

“Where are we?” is a question which must always interest persons of even the most ordinary experience and observation. It is answered by the surveyor and the engineer. The first answers this question by locating a point or line in space, with reference to a known place on the superficial area of the earth's surface; the second answers it by locating the same line or point, with reference to its position above or below the level of the sea, which great ocean plane is taken as the standard of the outside of the Globe of the planet which we inhabit.

That delicate instrument which acted upon by the force of nature, indicates the North, and in so doing designates all the other great courses of direction, is called the *mariner's compass*; but it might as well and as truly be called the land-man's compass also. The surveyor and the engineer would both be often lost without it. It is difficult to conceive how mankind contrived to do without, and before, its use and discovery. Yet it is very certain that the great Pyramids of Egypt, and many of the ancient temples of Greece are built upon as true an alignment with respect to the four chief cardinal points of direction, as any of the structures of the modern world. How this was done without the aid of those instruments now used for the purpose, is only the subject of conjecture, a conjecture which has forced some of the thinkers to the conclusion that what we call *discoveries*, are only re-findings of methods and instrumentalities well known before, but which once well known have afterwards perished and been lost sight of in the catastrophe of wars and revolutions so common among mankind. That the chief practical principles of surveying and engineering were known to the ancient world even in a high degree of excellence, is well deduced from the remains of the Roman, Grecian, Assyrian and Egyptian, roads, bridges, buildings and aqueducts. That some close attention had been given to land surveying at an early period in human history, may be gathered from the curse pronounced by the law of Moses, in Deuteronomy, against him “who removeth the ancient landmarks.”

This anathema finds a place in the laws of our State and in all the modern cases of criminal jurisprudence; and it receives the heartiest approval of every one employed in the avocation of land measurement. The word survey is derived from the French verb *surveoir*, to overlook, and land surveying may be considered the earliest practical application of the art of Geometry or earth measurement; and in some more or less rude form was co-eval with agriculture and the division and appropriation of the soil. This science and that of Geometry, which it in-

volves, was cultivated by the Egyptians, at a very early period. Herodotus, the first authority on the subject, assigns the origin of the art to the necessity of measuring the land of Egypt for the purpose of taxation, in the reign of Sesostus, 1351 to 1416 before Christ, while Plato, Strabo and others charge it to the annual overflow of the Nile, and the consequent necessity of every year fixing the boundary lines of each land-holder's estate. And Diadarus tells us that the land-surveyors of that day were composed of the sons of the priesthood; Euclid, sometimes called the Father of Geometry, was an Egyptian, being born in the city of Alexandria, 300 years before Christ, and his Elements of Geometry to this day is a textbook of the science.

Proclus, in his commentary upon Euclid's Elements, informs us that the art was brought to Greece, by Thales, a great discoverer in Geometry.

In Rome, surveying was considered to be one of the liberal arts, and the measurement of land was intrusted to officers to whom were given certain privileges of considerable dignity. During the Feudal Ages this science was practiced with considerable accuracy, as an examination of Ancient Records and Title Deeds will show.

Land surveying may be divided into four classes, and defined as follows:

*First.* For determining the contents of areas or dividing tracts into lots of smaller dimensions.

*Second.* Topographical surveying, which includes, besides measurement of horizontal lines and angles, that of the variation of levels also, so that superficial inequalities may be geographically represented.

*Third.* Hydrographical or maritime surveying, the object of which is the determination of the position of channels, shoals, rocks and shore lines.

*Fourth.* Mining surveying for fixing the position of underground works in mines, so that these can be correctly mapped.

The simplest form of surveying is with the Surveyor's chain. This chain is the invention of Edward Gunten, an English mathematician, who was born in Hertfordshire in 1581, and who died in London, December 10, 1626. He was educated at Westminster school and at Christ Church college, Oxford, where he gave his attention principally to mathematics. In 1608 he invented the sector, a description of which was written by him in Latin and disseminated in manuscript. He afterwards took holy orders, but his tastes being entirely inclined to mathematics, he procured the chair of astronomy at Gresham college, which he filled until his death. His line, sextant and scale are still much used.

In connection with the chain, the compass is in common use in ordinary surveying. The Chinese appear to have been acquainted with the property of polarity in Loadstone and in iron and steel magnetized by it, and to have been the first to apply this to science.

Dr. Gilbert, a high authority, states that the Compass was brought from China to Italy, by Marco Polo in 1260. There is evidence however of its having been in use in Syria, France and Norway before this time.

The telescope has also been made subservient to the use of surveying in some of its departments. The discovery of this wonderful instrument belongs to one of two humble individuals—Hans Sippersheim a spectacle maker of Middleburg, or Metius a native of Alkmarr. The former of these in October 22d, 1608,

presented his government with three instruments, with which, to use his own phraseology, one could see things at a distance, applying at the same time for protection, or the equivalent to a patent. Metius also made application later in the same month but said he had manufactured the same instruments two years before. These wonderful instruments soon found their way to London, Paris and Venice. At the last mentioned city, they were seen by Galileo who seized upon these inventions with the greatest ardor and made such important improvements in their manufacture that they became almost identified with his name to the exclusion of the poor spectacle maker of Middleburg.

The office of County Surveyor in the anatomy of Indiana is a very old one. It was created as early as 1819, with a few meagre statutory provisions respecting its duties. It is a position which has never received either the attention or the compensation which its importance deserves.

In some of the States, as in New York, there is a Surveyor General, elected by the people, who has supervision by law of this whole subject, and of the local officers charged with its administration and the custody and control of all the original plats, maps, and profiles first made in the work of surveying the lands of the State.

The duties of this office are now discharged, partially, in our State by what is known as the "Land Department" of the Auditor of State. But it is always in the hands of some subordinate of that office, and it may be worth while to consider whether the public interests would not best be subserved by the creation of a new officer, who should be specially charged with these important duties and others connected therewith, to be known as the "Surveyor General of Indiana."

Real property, as far as its separate ownership is concerned, depends upon, and is defined by, *metes and bounds*. Metes and bounds depend upon the *compass*. This instrument, the beau ideal of constancy, is itself, nevertheless, subject to what is called, "magnetic variation" from the true meridian. The commission upon the revision of the laws reported to the last General Assembly, from very careful data furnished them by an able committee of Engineers and Surveyors, a provision in amendment of the present law. This provision required that the County Surveyor in each county, at or near the county seat thereof, upon a day named in every year thereafter, should establish, by a line of convenient definite length, the course of the true meridian, and mark at the same time the variation, keeping a record of such establishment and variation, and that instruments in use should be compared with and corrected by the measurements so ascertained. But in the haste and pressure of other business, either really or fancifully, of more importance, the amendment did not become a law. I trust that the attention of the legislative bodies may be again directed to this very interesting and important subject. Of course it will cost something to make these improvements in the present law, and to carry them into practical operation, but in my judgment it will cost much more not to make them.

The law of Indiana with respect to the survey of lands, is yet somewhat meagre; it is not very definitely settled even by judicial decisions. A few general principles may be deduced therefrom, having been so often declared as to become axioms in this department. It must not be forgotten that as to points and lines upon the original subdivisions of the public lands, the duty of the surveyor is to find the

points and corners as established by the survey of the United States Government. These when found, control the survey both as to course and distance, even although they may be mathematically inexact and erroneous.

Doe v. Hildredth, 2d Ind., 274.

Keesling v. Truitt, 30 Ind., 307.

West v. Cochran, 17 Howard, 414.

The United States survey controls every other. The Federal Government has invested the Executive Department thereof with all powers and jurisdiction as to the surveys of the public lands. Independently of the United States surveys, as fixed by the political power of the United States, litigants have no standing in any court. It is decided in our State that unequal surveys, made under authority of the Government must stand, and the monuments thereof must be followed, even although upon actual measurement a shortage appears, which shortage must be thrown to the north and west. These boundaries may, however, be controlled to some extent and changed by the agreement of parties, by a long term of acquiescence, or by what is sometimes called adverse possession.

Myers v. Johnson, 15 Ind., 261.

Ball v. Cox, 7 Ind., 453.

Evansville v. Paige, 23 Ind., 535.

The visible monuments of an old survey, whether natural or artificial, control measurements, distances, course and direction, even against actual mensuration and calculation. The result of an experimental survey, however accurate, is disregarded if it conflict with monuments of an old survey, already established, however erroneous.

The rule that visible monuments control measurements and distances is a very valuable one and would be more so, if we could find them, or even determine the places, with certainty where they stood. As to the latter point evidence is always competent if properly accessible.

Simonton v. Thompson, 55 Ind., 88.

Emmons v. Kiger, 23 Ind., 483.

Hedge v. Sims, 29 Ind., 574.

In the timbered portion of our State, trees were so abundant at the time of the original survey and so freely used, notched, blazed and corner-marked that it is comparatively easy to determine all lines and corners. And the same remark applies in the broken or hilly portions where stones and rocks abound. But in the prairie portions of our State, there are vast tracts of land where neither a tree or stone could be found, and one may traverse miles and miles of the original plats without finding any other designation than "mound in prairie." No doubt the spot was marked plainly enough at the time of the old survey, but years have obliterated it so that it is very difficult, often, to distinguish these so-called "mounds" of the marker or rodsman from the work of the ants, the mole or the muskrat. In such cases at present, much must depend upon the judgment, skill, patience and discernment of the officers engaged in retracing these old boundaries. But I would always advise a long, faithful and diligent search for the old monument, rather than the establishment of a new one, however much the latter might



be verified by the results of an actual experimental survey made in these later times, because a discovery of the old landmark or the ascertainment of its location would invalidate the new one.

In addition to this it must be recollected that there is a vast number of lines and boundaries which although roughly drafted upon the original plats had in fact never been traced by the officers of the Government at all. I refer now to what are called by Surveyors, meander, or meandered lines, following the course of streams and rivers.

With respect to these it is held that the riparian owner or the owner of the adjoining banks of a non-navigable stream owns the land along it to the thread or centre of the stream; and this without respect to changes which may occur in it; and although the meandered portion may not have been included in the survey, nor paid for to the Government. The Supreme Court of Indiana, say upon this subject: "The Government was not selling her public lands only for the purpose of making money." \* \* \* \* Her object was to induce the settlement in the country of a hardy land-owning people. Her surveys of the whole, were more or less inaccurate, we know as a matter of fact and of general knowledge, that often sections exceed and often fall short of the quantity paid for, even when what are called meandered lines are not concerned.

Ross v. Faust, 54 Ind., 471.

The inequalities and inaccuracies of original surveys must be expected, looked for and regarded. The first purchaser takes title from the Government for the tract included in the original survey and its meander lines, if there be such lines; be the same more or less as to the number of acres therein.

Indeed the system of United States Survey of lands, leads unavoidably to certain inaccuracies. It is extremely doubtful if human wisdom be sufficient to prevent such a result under any system.

The law and instructions concerning the survey of the public lands require that the lines forming the east and west boundaries shall be *true* meridians; they also require that the townships shall be *square*, six miles square, an impossible condition; because as the figure of the earth is not a true sphere, but spheroidal only, these meridian lines must converge toward the pole. The north line of a township must always be some shorter than the south, and this inequality increases as the survey advances to the north. The authors and administrators of the system admit this imperfection by providing as has before been noted that shortage shall be thrown north and west; and by providing in some of the States for the running of what are called "correction" lines, at an interval of every five or ten miles of northing.

The branches of science known as topographical and hydrographical engineering and surveying, approach very nearly to the highest regions of pure mathematics. They deal very largely in the mensuration of areas, contents, spaces, and distances by methods similar to those employed in calculating these elements in the solar and stellar world. Yet as all the various rules of arithmetic are said at last to be reducible to but simple addition and subtraction, so with these so-called superior department of the science of surveying and engineering: they rest upon an ultimate basis of the simplest postulates.

This soaring philosophy starts all from the ground. From its low and humble perch upon the earth's surface, science mounts into the regions of the fancy and

imagination, and converses with the suns and stars. Great improvements have been made, even in the last half century in the means and methods of surveying and engineering, but they are all in the same direction, they constantly propose the same *sum* to us; that is, to find out the *unknown* from the *known*. As familiarly illustrative of this, allow me to relate an incident in the life of one of the first land speculators and explorers who visited this Continent. Sir Walter Raleigh has given name to the capital city of one of the States, and it is said among his other titles to distinction, that he was among the first persons to introduce the use of tobacco into England. Sir Walter at this time in high favor with Queen Elizabeth, frequently indulged in the use of the odorous narcotic, by her request in her presence, as the whole operation was then very much of a novelty.

The knight, on one of these occasions, called her attention to the smoke gracefully curling from his pipe into the air and made a wager of a purse of gold with her that he could tell its exact weight. Such a curious wager, readily entered into by the Queen in the spirit of banter, half jest and half earnest, which then characterized their intercourse, attracted general attention in court circles. A day was appointed for its determination. The Queen and a large company attended to see the result, many of whom, no doubt, gladly anticipated the defeat and discomfiture of the favorite in the royal presence. Sir Walter prepared himself very carefully upon the experiment. He brought with him a new porcelain pipe with a glass stem and a parcel of choice tobacco, with which he carefully filled the pipe-bowl. The Queen, who sometimes amused herself with experiments in chemistry, had a very delicate and accurate pair of ivory scales with weights of gold. The knight took the tobacco out of the pipe, and with these scales weighed it, noting the weight very precisely in the presence of some ladies of honor, in waiting, who had been designated as judges in the matter in question. He then, with great care, replaced the tobacco in the bowl, lighted the pipe and, going into an adjoining veranda, commenced smoking. The vapor rolled away in fanciful clouds and eddies, and meanwhile a great deal of sport was made, at the knight's expense, at the notion of weighing a thing so subtle and intangible, and the more, because Sir Walter took no pains to prevent the escape of the fumes, but let them float away at random through the windows of the adjoining apartments and into the open air, whithersoever the wind carried them. Many a fair lady said, laughingly, as she inhaled a sniff of it, that she was confident she had got at least a pennyweight of it, and that the knight would surely lose his reckoning and his bet too.

He, however, continued very seriously and soberly to smoke his pipe until it was entirely exhausted and naught remained but the dead ashes. These he then very carefully took from the bowl, turned them into the same scales, and weighed them in the same manner as he had weighed the tobacco, subtracting then the weight of the ashes from that of the tobacco, he was enabled to give the exact weight of that which had escaped in vapor. The laugh would now have been turned in his favor, had the loser not been the sovereign. The Queen and all those present were pleased with the beauty and preciseness of the test. She cheerfully paid him the purse of gold, saying that he had fairly won the wager, and that his weighing of the smoke must now be set down among the other achievements which have made him so famous.

The great problem in science has always been, and yet is, to determine and ascertain the *unknown* from that which is *known*. The elementary truths in every

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department have been known to all mankind for many ages. But to determine from these, clear, simple and self-evident as they are known and seen to be, those things which are not seen and not known; this is the task which humanity is always proposing to itself. The fall of the apple was an ordinary phenomenon, which must have been observed millions of times before Newton saw it. Yet from this known fact, deeply considered, the law of gravitation and of the courses of the heavenly bodies was all at last deduced.

The Surveyor or the Engineer will from measured lines and known angles upon one side of a river tell the width of the stream without crossing it, and by methods somewhat similar will determine the height of a crag or peak without ascending it. And in much the same manner, the distances and courses of bodies of the planetary world are ascertained, by the measurements, to begin with, of known base lines and the angles thereto incident upon the surface of our globe.

All the discoveries in science and inventions in art have had their beginnings in the known, and yet have carried their deduction as to the unknown to such marvelous extent as almost to seem supernatural. Moreover we might thus proceed through the whole spacious realm of thought and action, to find only that the unknown is still much greater than the known—greater and yet more glorious.

THE 18 INCH TELESCOPE.

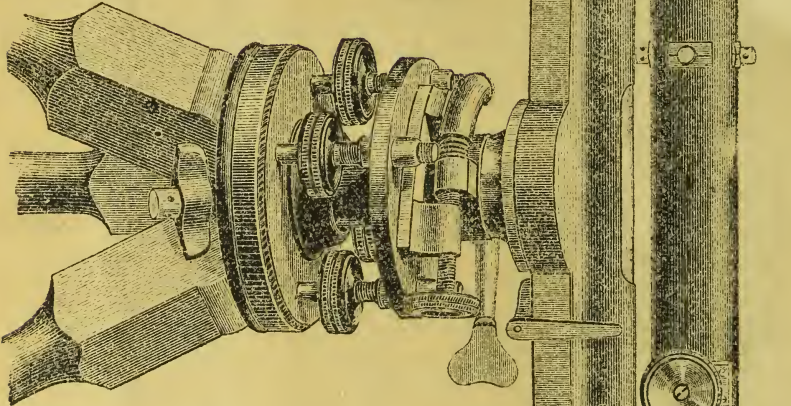
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*Engineering*

HALL STAMPS

A. J. TEED,  
Civil Engineer  
AND SURVEYOR,  
CADILLAC, MICHIGAN.  
PROCEEDINGS

OF THE

Association of County Surveyors

AND

CIVIL ENGINEERS

OF THE

STATE OF INDIANA,

AT ITS THIRD ANNUAL MEETING, HELD IN INDIANAPOLIS, IND.,

*JANUARY 16th and 17th, 1883,*

TOGETHER WITH

Constitution, By-Laws and Other Valuable Matter.

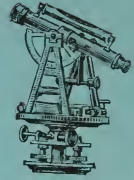
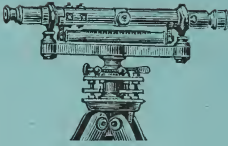
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# PROCEEDINGS

OF THE

## Association of County Surveyors

AND

## CIVIL ENGINEERS

OF THE

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W. C. WEST, PRINTER.

1883.

# OFFICERS

FOR 1883 AND 1884.

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FATOUT, H. B., PRESIDENT, . . . Indianapolis, Indiana.  
SPENCER, R. R., VICE-PRESIDENT, . . . Clarksburgh, Indiana.  
PULSE, JAS. C., RECORDING SECRETARY, . . . Greensburgh, Indiana.  
ALTER, L. S., CORRESPONDING SECRETARY, . . . Rensselaer, Indiana.  
MORRISON, R. I., TREASURER, . . . Knightstown, Indiana.

---

## EXECUTIVE COMMITTEE.

WALTER A. OSMER.                      R. R. SPENCER.                      H. B. FATOUT.  
R. H. WALLS.                              R. P. MAYFIELD.

---

## LEGISLATIVE COMMITTEE.

W. A. OSMER.                      R. R. SPENCER.                      H. B. FATOUT.

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## PRINTING COMMITTEE.

JAS. C. PULSE.                      H. B. FATOUT.                      C. E. ROGERS.

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## PREFACE.

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*To the Members of the Association of County Surveyors and Civil Engineers of the State of Indiana:*

The Committee herewith present a report of the Third Annual Meeting of the Surveyors' Association, held in accordance with our by-laws, at Indianapolis, and opening on the afternoon of January 16, 1883.

Every precaution had been taken by the officers and members to insure a full attendance. Many of the county surveyors of the State were present, and several others sent letters expressive of interest in the Association.

To those of you who were not able to be present, we desire to say that all possible pains will be taken to insure to you all the advantages of our union that the nature of the case renders possible, in the way of reports, instruction and information; but, we desire especially to call your attention to the pleasure and profit resulting from a personal intercourse, even if limited in extent, with friends and brothers of like thoughts, desires and intentions with your own, and could you recognize its value and significance as clearly as do those who were in attendance, we are assured that nothing but illness would prevent your presence in January, 1884.

Copies of this report will be sent to any address that members may forward to the Corresponding Secretary, and in return we beg of you such aid and assistance in carrying on our work as your position and advantages render feasible.

Respectfully submitted by

COMMITTEE.

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# CONSTITUTION

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## ARTICLE I.

This organization shall be known as the Association of County Surveyors and Civil Engineers of the State of Indiana.

## ARTICLE II.

Its objects shall be for mutual benefit and for the advancement of the profession.

## ARTICLE III.

Its officers shall consist of a President, Vice President, Recording Secretary, Corresponding Secretary, Treasurer and Executive Committee of five members.

## ARTICLE IV.

The duties of these officers shall be the same as those of like associations.

## ARTICLE V.

All county surveyors and deputy county surveyors and civil engineers of the State of Indiana may become members, upon recommendation of the Executive Committee and the payment of an initiation fee of one dollar, and signing the Constitution and By-laws.

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## BY-LAWS.

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SECTION 1. This Association shall meet annually, at the city of Indianapolis, on the third Tuesday of January. The meeting to be called to order at 2 o'clock P. M.

SEC. 2. The officers of this Association shall be elected by ballot, on the morning of the second day of each annual meeting; officers elected to assume their respective duties immediately after election.

SEC. 3. It shall be the duty of the Executive Committee to provide a room for the meeting, and the Corresponding Secretary to give twenty days notice of said meeting to the members and County Surveyors of the State of Indiana.

SEC. 4. Each member shall pay an annual membership fee of (\$1.00) one dollar to the Treasurer, at each regular meeting after becoming a member of the Association.

SEC. 5. The Treasurer shall pay only such bills as are approved by the Executive Committee.

SEC. 6. No member shall be allowed to speak more than twice upon the same subject, unless by consent of a majority of the members present, and the Association, in its business transactions, shall be governed by Cushing's Manual.

SEC. 7. The President shall have power to call an extra session when required by the Executive Committee.

SEC. 8. One-fourth of the number of registered members shall constitute a quorum for business at any regular or called meeting.

#### SUPPLEMENTARY CLAUSE.

ARTICLE I. The Constitution may be altered or amended at any regular meeting, by a two-thirds vote of the members present.

ARTICLE II. The By-laws may be altered or amended at any regular meeting by a majority of the votes of the members attending.





## REPORT OF PROCEEDINGS.

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According to previous notice from the Corresponding Secretary the Association of County Surveyors and Civil Engineers met in the Surveyor's office, Indianapolis, Indiana, January 16, 1883, and was called to order at 2 P. M. by the President, Walter A. Osmer.

The Secretary being absent, Jas. C. Pulse, of Decatur county, was selected Secretary *pro tem*. The President delivered a short address of welcome, and the urgent necessities for earnest, thorough work by this Association.

The report of the Committee on Order of Business was called and reported by the Chairman, R. I. Morrison, and, after some corrections, approved and committee discharged.

The report of the Treasurer was called and report made by the Treasurer, Mr. Piatt, of LaGrange county. Said report showed the financial condition of the Association prospering.

On account of the absence of Messrs. Leach, of Johnson county, and Polk, of Gibson, Messrs. Spencer, of Rush, and Fatout, of Marion county, were added to the Legislative Committee.

The President appointed Messrs. Mayfield, of Knox, Walls, of Putnam, Alter, of Jasper, and Polk, of Gibson, said gentlemen to constitute a Committee on Gravel Roads, to confer with House and Senate Committees on Highways, and report the same.

Mr. Alter gave a short but interesting report of What I Know of Indiana Surveyors, obtained by him through general correspondence with the various county surveyors of the State. His statistical report showed an upward and elevating tendency of the surveyor's office of the State of Indiana.

The remainder of the proceedings of the Association will be found under their appropriate heads.

## REPORT OF COMMITTEES.

The programme was called from the Committee on Order of Business and reported by their chairman, R. I. Morrison, viz.:

JAN. 16, 1883—Afternoon Session—General Business.

Evening Session. 1st, Address—Subject: "Responsibility of Surveyors." P. C. Vawter, Tippecanoe county. Discussion. General Business.

JAN. 17, 1883—Morning Session, 8 A. M.—Address—Subject: "Degree of Accuracy to be Obtained by Surveyors." William Truitt, Delaware county. Discussion. General Business.

Afternoon Session, 2 P. M. Address—Subject: "Laws Pertaining to Surveyors and their Duties." Jas. C. Pulse, Decatur county. Discussion. General Business.

JAN. 18, 1883—Morning Session, 8 A. M. Address—Subject: "Gravel Roads." Ira McConnell, of Montgomery county. Discussion. General Business.

Afternoon Session. Address—Subject: "Drainage." Walter A. Osmer, Cass county. Discussion. General Business.

The report of the Legislative Committee was called and reported as follows, viz: We the committee, upon investigation, find that some seventeen or eighteen counties containing swamp lands in the State of Indiana that need draining, but can not work under the present circuit court law of the State of Indiana. (Approved April 8, 1881.) That statute provides that the county surveyor shall be commissioner *ex officio*, and shall be the engineer. Now then, on account sometimes of either incompetency or disinclination to provide himself with the proper instruments, and that the present drainage law of the above named act makes no provisions for such emergencies, even prohibiting the appointment of a deputy surveyor to do the work; therefore we respectfully recommend that section 2 of the above named act be amended so that such surveyor may appoint a deputy, to be approved by court, who shall be empowered to do the necessary engineering, thereby enabling the owners of swamp lands to have them drained. Also, to amend section 4 of the above act so as to allow persons ten days after the report of the commissioners in which to remonstrate against the construction of the ditch, instead of three, as now provided in said act.

The Association then resolved itself into a Committee of the Whole to consider said report. After some time spent in careful deliberation the Association determined to appoint a sub-committee of three members to confer with the Senate and House Committees relative to the proposed amendments. Said committee consisted of Messrs. Spencer, Fatout and Osmer. The Senate and House Committees expressed their willingness to report such amendments, and accordingly appointed Judge Turpie, R. R. Spencer and H. B. Fatout to prepare said amendments, which was done. (See Enrolled Act No. 287, Senate, approved March 8, 1883.) When the committee arose and the Association took a recess until 2 P. M.

#### TREASURER'S REPORT.

*To the Officers and Members of the Association of County Surveyors and Civil Engineers of the State of Indiana :*

I herewith submit my annual report of receipts and expenditures for the fiscal year ending January 17, 1883 :

#### RECEIPTS.

January 16, 1883. Amount on hands per old report.....	\$14.50
Receipts . .....	68.00
Total.....	<u>\$82.50</u>
Expenditures.....	40.05
Net balance on hands.....	<u>\$42.25</u>

ISAIAH PIATT, Treasurer.

#### PERSONALS.

The growing interest of the Association was manifested by the large number in attendance and the numerous letters received from surveyors and engineers in different parts of the State, expressing their regrets for forced absence from the many ills that torment life. Besides the surveyors and engineers present, there were a large number of men of other professions and business relations. Prominent among these were Jon. L. Dobyns, auditor of Decatur county ; Hon. S. W. Williams of Knox, Representative Gordon of Putnam, Hon. O. L. Pulse of Decatur. All were introduced and made appropriate remarks.

ANSWERS TO QUESTIONS ON PRACTICE AND MISCELLANEOUS  
 QUERIES.

A series of questions propounded by Francis M. Priest, of Bryan, Ohio, was read and referred to a select committee of three. Said committee consisted of Messrs. Osmer, Rogers and Webster, whose answers were reported as follows, viz:

1. Where there is no local attraction, is a solar attachment on a compass or transit necessary to the county surveyor? Ans. No.

2. Near or upon a railroad track, can the magnetic needle be relied upon for taking correct bearings? Ans. No.

3. Should diurnal variation be allowed for, and should the hour a bearing was taken, be recorded with the same? Ans. Impracticable.

4. After taking the first bearing of a line, should the surveyor be governed by the back sights or by the needle in running the line? Ans. Back sights.

5. In surveying fractional sections, and establishing quarter corners in the same, should the lines be divided *pro rata*, according to the government notes, or should the east or south quarters—as it may be—be made “full,” and all excess or deficiency be allowed for on the west or south quarters of the fractional or closing section? Ans. Divided *pro rata*, so as to correspond with government survey.

6. When using eleven pins in chaining, do you give one to the rear chainman at starting? Ans. Yes.

7. Should the surface or top of a road grade be made level or rounded? Ans. Six inches crowning.

8. Should tile, where practicable, be laid on a regular gradient, or if not, should the greater fall be given at the commencement or outlet of the drain? Ans. Greater fall at outlet when practicable.

9. Is it best in all cases to lay the larger sized tile at the outlet of a drain? Ans. Yes.

10. What is the minimum amount of fall or gradient to be given to tile drain, and to open drain? Ans. One-half inch to one hundred feet.

11. Is it an advantage in transit instruments to have the limb graduated to less than minutes? Ans. Yes.

12. What is your opinion as to the advantages claimed for inverting telescopes?  
 Ans. A great advantage in every respect.

13. In retracing old lines how do you make allowance for annual change of variation? Ans. By establishing meridian and taking annual change.

14. In hot and dry weather, the needle will vary to the extent of one-half a degree further westward, when bearings are taken in thick shaded places, as forests, than when bearings are taken in open fields exposed to the sun. What is the cause of the disturbance? Ans. Solar attraction.

15. At what distance should an ax, steel chain, or pins, pocket knives or road vehicles be kept away from the instrument when taking bearings to insure correct work? Some surveyors say six feet is sufficient, and others say fifty or more.  
 Ans. Chains, axes, etc., should not be less than ten to fifteen feet distant from the instrument.

Respectfully submitted,

W. A. OSMER,

C. E. ROGERS,

CHAS. WEBSTER,

Committee.

WHEREAS, The Association of County Surveyors of this State is now in session in this city; therefore, be it

*Resolved*, That privileges of the floor of this house be extended to the members of said Association, and that they are hereby invited to visit this house.

S. W. WILLIAMS, of Knox County,

O. L. PULSE, of Decatur County,

Committee.

#### QUERIES ON LEGALITY.

Who should be the proper one to set section and quarter section stones on county lines?

The county surveyor of either county, jointly or severally, with bearing and records in each county. (Ind. R. S., 1882.)

Who should be allowed to make entries in surveyors' records?

The county surveyor or his deputy, and none other.

Who is the proper custodian of the field notes?

The county surveyor, and none other, is and should be the proper custodian of the field notes.

#### ELECTION OF OFFICERS.

The President announced the first order of the afternoon was the election of officers for the ensuing year, resulting as follows:

President—H. B. Fatout, Indianapolis, Marion county.

Vice President—R. R. Spencer, Clarksburg, Decatur county.

Recording Secretary—J. C. Pulse, Greensburg, Decatur county.

Corresponding Secretary—L. S. Alter, Rensselaer, Jasper county.

Treasurer—Rob't I. Morrison, Knightstown, Henry county.

Executive Committee—W. A. Osmer, R. R. Spencer, H. B. Fatout, R. H. Walls, R. P. Mayfield.



## INAUGURAL ADDRESS.

The newly-elected President, prior to assuming the duties incumbent to said office, following the custom of his predecessors, delivered the inaugural address, which was timely and appropriate and well received by the Association. At the close of the above exercises the other officers assumed the duties incumbent to their respective offices.

## PAPERS READ.

On account of sickness, Mr. Truitt was prevented from attending the annual meeting of the Association and participating in the duties of the same. The Association selected Robert I. Morrison, of Knightstown, to occupy the time and subject made vacant with Mr. Truitt's absence. Mr. Morrison delivered an extemporaneous address. Subject: "Degree of Accuracy to be Attained by a Surveyor." He held the undivided attention of the Association for three-quarters of an hour.

He thought that an old stone for a corner, without record or anything else by which it could be identified as a surveyor's corner, is not to be relied on. Any one, with or without accurate measurement, with or without authority, with or without a purpose to enlarge his own boundaries, may have placed it there. Yet those old stones may have a record somewhere amid the old papers of the land-owner—in a deed, in a trade or sale; and without the consent of all parties concerned, it is best not to move them, but to leave them undisturbed. If they are certainly in the wrong place it disturbs nothing to leave them there, to put in another stone for the true corner and to record it properly, so that future surveyors may have no difficulty in identifying yours as the true corner.

Where there can be found neither U. S. corner nor reliable county survey corner, the section corners may be re-established by running lines from the quarter section corners, east, west, north and south. Some of these quarter corners may appear to be extinct also. U. S. corners are, in truth, seldom entirely extinct. Some future surveyor, a better surveyor than you are, if such a preposterous thing were possible, might dig in the right spot and find the bearing trees for the corner without difficulty, where you had entirely failed. The corner may often be restored by running from the nearest station tree given in U. S. notes. Some old settler may be able to show you nearly the exact spot where stood the original post, or point out to you where is the old stump of an original bearing tree.

In timber blazed lines are not infallible, but are often a good guide in finding where to hunt for nearly extinct corners. Your measured distances may not agree with those given on the U. S. plat—a U. S. 160 acre tract almost always contains an acre or so more—of course then the measure will not agree. The United States survey, where absolute accuracy was altogether impracticable, was intended to lean towards the liberal side and to give the settler at least all of the acres he paid for, and if it gave him more it was rightly conjectured he would not object.

The decayed roots of bearing trees, all surface traces of which had disappeared were described. The beech, hickory, sugar, walnut, hornbeam, ash, oak, cherry, and even the abominable buckeye, were often taken as B. T's. by the old time U. S. Deputy Surveyors. He extolled the beech as the surveyor's best bearing tree, best station tree and best tree for blazing lines. After its surface roots have disappeared and the wood in its three deeper roots (from which the center of the tree can readily be determined) has entirely decayed, the sausage-like skin of the bark



remains for years, filled, it may be, with solid earth which has percolated it. The buckeye is the poorest of all, surface roots only, which soon decay, leaving no traces. The settler's first care is to destroy this tree because the poisonous character of its leaves endangers the safety of his herd. Hickory has a splendid center root, but storms sometimes uproot the tree and tear the center root out; on that account it is not a good bearing tree, and like ash and sugar it soon decays after death. Sycamore and elm have wide spreading roots which resist decay for many years. In badly decayed cases the center might be taken almost anywhere within a radius of ten feet. Oak and walnut are exceptionally good. The speaker then gave a number of instances from his own field practice where he had found the remains of old U. S. bearing trees, in one of which the curly wood of a badly decayed sugar was determined by the aid of the magnifying power of his reading glass; and where U. S. corners were restored satisfactorily to all concerned and to himself, in cultivated fields and in gravel roads where all timber had been cleared away from fifteen to fifty years before.

He exhibited a diagram of a re-survey ordered by the county commissioners, on which, with assistants selected for their efficiency, he was employed for nine continuous days and restored no less than nine U. S. corners, one being found at every point where needed to make the survey a complete retracing of the original lines. The success of the survey can perhaps be better understood when it is stated that the original U. S. survey was made sixty-three years ago; that the whole region surveyed was destitute of reliable county surveys or corners, and that the farthest corner from New Castle, the county seat, is distant but three and a half miles.

A very interesting paper was read on "Drainage" by Walter A. Osmer, of Logansport, Indiana, which was ordered printed in the minutes.

"Laws Pertaining to County Surveyors and their Duties" was read by Jas. C. Pulse, Greensburg, Decatur county, and was ordered printed in the annual report.

#### APPOINTMENTS FOR JANUARY, 1884.

The following are the persons and subjects appointed to prepare papers for the fourth annual session, January, 1884:

JAN. 1884—Afternoon Session, 2 P. M. Address of Welcome by the President.

Admission of New Members, and Payment of Dues. Report of Officers and Committees.

Evening Session, 8 P. M. Address: "The County Surveyor. Where and What is He?" R. P. Mayfield, Knok county. Discussion opened by C. E. Rogers, Jay county. Miscellaneous.

Second Day—Morning Session, 9 A. M. Election of Officers. President's Inaugural Address. Appointment of Committees. Address: "Gravel Roads and Bridges." R. H. Walls, Putnam county. Discussion opened by J. B. Malott, Lawrence county. Miscellaneous.

Afternoon Session, 2 P. M. Address: "Instruments and Measures." R. I. Morrison, Henry county. Discussion opened by W. A. Osmer, Cass county. General Business. Address: "Best Forms of Reports on Ditches and Gravel Roads, and Proper Forms of Notices and Survey, and Best Manner of Recording same." H. Wagoner, Huntington county. Discussion opened by C. E. Murry, of Grant.

Evening Session, 8 P. M. Address: "Responsibility of Surveyors and Engineers." H. B. Fatout, Marion county. Discussion opened by Jas. C. Pulse, Decatur county.

## LIST OF MEMBERS.

NAMES.	POST OFFICE.	COUNTY.
Alter Lewis S . . . . .	Resnselaer . . . . .	Jasper.
Alder Leon S . . . . .	Nashville . . . . .	Brown.
Baker J. E. . . . .	Indianapolis. . . . .	Marion.
McConnell Ira . . . . .	Crawfordsville. . . . .	Montgomery.
Clark James A. . . . .	Danville . . . . .	Hendricks.
Fatout Hervey B. . . . .	Indianapolis. . . . .	Marion.
Fries Winfield S. . . . .	Greenfield. . . . .	Hancock.
Harris George W. . . . .	Macksville . . . . .	Vigo.
Brennon James H. . . . .	Shoals . . . . .	Martin.
Leach D. A. . . . .	Franklin . . . . .	Johnson.
Murry E. C. . . . .	Marion . . . . .	Grant.
Morrison Robert I . . . . .	Knightstown . . . . .	Henry.
Osmer Walter A . . . . .	Logansport . . . . .	Cass.
Piatt Isaiah . . . . .	LaGrange . . . . .	LaGrange.
Pulse James C. . . . .	Greensburgh . . . . .	Decatur.
Polk Alex. H. . . . .	Princeton . . . . .	Gibson.
Shepard Otis. . . . .	Goodland . . . . .	Newton.
Sanders James . . . . .	Westfield . . . . .	Hamilton.
Smith Levi . . . . .	Bloomington . . . . .	Parke.
Shea James W. . . . .	Wabash. . . . .	Wabash.
Truitt William . . . . .	Muncie . . . . .	Delaware.
Walls R. H. . . . .	Greencastle . . . . .	Putnam.
Spencer R. R. . . . .	Clarksburgh. . . . .	Decatur.
Wiles E. P. . . . .	Hartford . . . . .	Ohio.
Root Lewis B. . . . .	Goshen . . . . .	Elkhart.
Malott John B. . . . .	Bedford . . . . .	Lawrence.
Vawter P. C. . . . .	Lafayette . . . . .	Tippecanoe.
Miller S. J. . . . .	Rochester. . . . .	Fulton.
Neal C. F. S. . . . .	Lebanon . . . . .	Boone.

LIST OF MEMBERS—*Continued.*

NAMES.	POST OFFICE.	COUNTY.
Campbell Jno F . . . . .	Indianapolis . . . . .	Marion.
Rogers C. E. . . . .	Portland . . . . .	Jay.
Streadling E. H. . . . .	Muncie . . . . .	Delaware.
Wood F. D. . . . .	Seymour . . . . .	Jackson.
Flumpson N. L. . . . .	Crawfordsville . . . . .	Montgomery.
Grubb Henry . . . . .	Mansfield . . . . .	Parke.
Hiatt Spencer . . . . .	Martinsville . . . . .	Morgan.
Barton F. M. . . . .	Blufford . . . . .	Wells.
Wagoner H. H. . . . .	Huntington . . . . .	Huntington.
Cottingham E. F. . . . .	Noblesville . . . . .	Hamilton.
Mayfield Robert P . . . . .	Vincennes. . . . .	Knox.
Beavers M. H. . . . .	Covington. . . . .	Fountain.
Murphy George S. . . . .	Shelbyville . . . . .	Shelby.
North A. . . . .	Plymouth . . . . .	Marshall.
Harris G. W. . . . .	Terre Haute . . . . .	Vigo.

# L A W S

PERTAINING TO

## SURVEYORS AND THEIR DUTIES.

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“I have a conviction that we are now standing face to face to one of the most important epochs in the history of progress. I will not, and can not, say the most important, for men in all ages have thought their own the most momentous and sublime.” As a general rule, how vague and shallow the soundings. Viewing it as I do from the “high and dry light” of calm reason, I am forced to believe that no period of the past has thrown such results into the history of civilization as that of our present time.

Prior to the year of 1829 such luxuries as steam transportation through the country were unthought of and unknown. But now the old horse-cart has given place to the steam locomotive, which threads our country in almost every conceivable direction at lightning speed along the iron rails.

Through the genius of a Fulton the old and slow floating flat-boat and sail-ship have given place to the swift sailing ships and steamers that pass to and fro over the mighty waters of our country.

Morse and Edison, by catching the lightnings and controlling the elements, have enabled us to converse with ease and accuracy with the most distant parts of the world as though they were standing face to face.

In the same course I may well say have that of our great mathematicians, who rose early in the dawn of our present century, and long before their sun had reached its noon, thrown open wide the door to let the morning light of their discoveries light up the profession of land surveying and civil engineering. Prior to this time the instruments used by the Surveyor General and his deputies were of an inferior pattern and class, and as a natural consequence their work less accurate and reliable. Their forms of commencing, ending, and system of procedure were far inferior to those of a later date. The early land grants, and which consequently the first States, were located from some particular tree, creek, river, bluff

or lake, with their ever diverging lines and lapping corners. Such is the condition of all the early settled States.

“Immediately after the close of the War of Independence the great statesmen of the age, foreseeing the inestimable value, present and prospective, to this Republic for the division of the National territory, and for a gradual and progressive transfer to individual ownership under well defined principles, took measures to these ends as shown by the journals. Hon. Joseph S. Wilson introduced the following resolution into the Continental Congress on the 7th day of May, 1784: “An ordinance for ascertaining the mode of locating and disposing of lands in the western territory.” That ordinance was discussed and amended until at the expiration of one year from its introduction it was finally passed, May 7th, 1785. It had no precedent in theory or practice in any pre-existing government. It was the result of not only the highest order of statesmanship, but showed a profound knowledge of engineering and science in its most minute details.

This ordinance made provisions not only for surveying but for disposing of the public lands. As the extension of public lands are the essential prerequisites to the consummation of the titles, and though this system in the main has been used throughout all the government titles their correctness, the few errors occurred therefrom proves usefulness and superiority.

This system has been progressing gradually until it embraces all from Plymouth Rock to the Golden Gate, and from the 49° north parallel to the Gulf and Rio Grande on the south, excepting the six New England States, New York, Pennsylvania, New Jersey, Delaware, Maryland, Virginia, North Carolina, South Carolina, Georgia, Tennessee, Kentucky and Texas. The United States at the time of the survey of these States were not the owners of these lands. During the period of ninety-eight years this system has met the wants of the people, securing ready and unerring landmarks, the permanency of which, as well as the feasibility of their restoration, when destroyed by time or accident, has obviated litigation respecting titles of tracts thus defined.

All public lands should be divided by lines running north and south, parallel with the true meridians, and crossed by lines at right angles, dividing it into townships of six miles square, unless said line or lines intersect an Indian reservation or the course of navigable rivers, which renders it impracticable, or tracts previously surveyed and platted. The corners of such tracts must be marked with progressive numbers, and all lines shall be plainly marked upon the trees that may be found in their course, and measured with a chain containing two perches of sixteen and one-half feet each, subdivided into twenty-five equal links each, and shall be adjusted to a standard kept for that purpose. U. S. R. S., Sec. 2,395.

The above is susceptible of still more comment. The system consists of an initial point at the intersection of the principal base line surveyed, and marked on the true parallel of latitude, from which point the established lines run to the four cardinal points of the compass.

From the principal parallel or base line townships are counted north and south, and for every four townships or twenty-four miles north, and five townships or twenty miles south, a correction parallel is established; and for every eight townships or forty-eight miles west, a correction or new meridian is established, thus



making parallelograms north twenty-four by forty-eight miles, and south thirty by forty-eight miles, which in like manner are divided into townships of six miles square, and these into sections of one mile square, and these are sub-divided into quarter, and again in like manner into quarter quarter.

The rectangular system affords a uniform and easy method of divisions, as well as that of descriptions; and the object of the U. S. government was, not selling her public lands for money only, but her main object was to induce the settlement of the country with a self-reliant, hardy land-owning people.

Many of these old landmarks have been proven, by later surveys, to be mathematically incorrect, and the townships show a shortage which must be left to the north half and west half of the last tier of sections in each township. And in order to prevent endless litigation caused by such errors the Supreme Court have rendered decisions all confirming all government surveys, however inaccurate. When the United States has parted with a title by a patent legally issued, and based upon surveys legally made by itself and approved by the proper department, the title so granted can not be impaired by any subsequent survey which the government may make for its own purpose. *Cage v. Danks*, 13 La. Ann. 128.

From this is a proof undeniable that the United States surveys control every other. The Federal government has invested the executive department thereof with all powers and jurisdictions as to the surveys of the public lands. Independent of the United States surveys, as fixed by the political power of the United States, litigants should test their claims in these courts, for they have no standing in any other. It has been decided in our State that unequal surveys, made under the authority of the government, must stand, and the monuments thereof must be followed, even though, upon actual measurement, a shortage is found, which shortage must be thrown to the north and west. These boundaries may, however, be controlled to some extent, and changed by the agreement of parties by a long term of possession, or acquiescence, or by adverse possession. *Myers v. Johnson*, 15 Ind. 261; *Dorsey v. Hammond*, 1 Har. & J. (Md.) 201.

In locating or re-locating a corner it is the duty of surveyor first to obtain a registered corner from which to start to run as nearly the direct course as present circumstances admit, exhausting every available evidence within his possession to re-locate the corner in the precise point of the early survey. For all available monuments, marks, whether natural or artificial, control all other surveys, whether the measurements correspond or not. The experimental survey, however accurate, must give way to visible monuments, however inaccurate and erroneous; for courses and distances must yield to natural and artificial objects of description. *Graveny v. Hinton*, 2 Greene (Iowa) 344.

The rule that visible monuments control junior surveys is a very valuable one, and would be far more a source of vast knowledge and benefit if the surveyor, with more care and accuracy, would seek for them.

The how to locate section and interior section corners next demands our attention. In ascertaining the lost corner of a section, which must be presumed, after the monuments of all other surveys recorded in the plat's field-notes have been exhausted, and if only one of the boundary lines leading to the lost corner has been obliterated, the remaining portion, whether straight or not, as marked, must be considered as established; and the corner must be presumed to be, in the ab-



sence of evidence to the contrary, to be where the marked lines, if extended, would reach the township line. But if the lost corner is proven to have been in another point of the lost portion of the boundary, it must be ascertained by running a straight line from the point at where the marks disappear to the corner. *Billing v. Bates*, 30 Ala. 378.

It is the duty of all surveyors, in locating, re-locating and establishing corners, that they should be marked with the letters, etc., and if corners are to be perpetuated, he shall deposit in the proper place a stone or some other durable material, with the letters and figures answering to such corners, and shall also enter in his field-notes one or more bearing trees, if there are such, the species, size, course and distance thereof; and if there be no trees then he shall deposit one or more stones or other durable material as witness of the corner; all of which proceedings shall be entered by him in a book to be kept for that purpose. R. S. 5950.

The sub-division of sections next demands our attention. In sub-dividing a section the surveyor should first find the true location of the half mile stone, and the lines should be straight from that one to the one on the opposite side of the section; and dividing quarter section the line should be such that they should be equal. In a survey of two half quarter sections of land, the object of which was to establish the corners, and which was made upon the principle of dividing the sections into equal parts, was held wrong. The corners should have been so established as to make the interior lots twenty chains wide, and to throw the excess or deficiency of measurement on the exterior lots. *Kessling v. Truett*, 30 Ind. 306.

Should a body of water extend through a section grant of land, if said body of water is not navigable, then the land is divided independently of said watercourse, but if said watercourse is a navigable stream, then the surveyor, in running the lines of a section, should stop at the point where the line strikes the river, and not continue across the river. The fraction thus made is complete, and its contents can be ascertained. And when the original boundaries of a tract of land can not be found, and it is afterward re-surveyed, if the re-survey reasonably conforms to the call of the grants, the grantee will hold the land contained in the re-survey against the State, or persons who have entered the land after the re-survey. *Garner v. Norris*, 1 Yerg. (Tenn.) 62; *Lewen v. Smith*, 7 Port. (Ala.) 428.

The Legislature should provide by statute, compelling county commissioners of each county or the surveyor to provide for the establishment of a true meridian at the county seat of their respective counties, for the purpose of testing and correcting the instruments used in said county, said meridian to be corrected by the county surveyor not less than once a year; and any and all persons using surveying instruments in such a county shall receive a certificate of correction. "For when a surveyor makes and describes a new line by course and distance, his plat and field notes must show the magnetic variation from the true meridian; but in establishing old quarter section corners, it is unnecessary to ascertain the variation and record it." *Kincade v. Domsey*, 47 Mo. 337.

Gentlemen, there is another question indirectly connected with the subject assigned me. It is a well known fact that while the statutes consume pages in setting forth the duties of other officials, whether county, township or otherwise, while those regulating the surveyors are very meager and unsatisfactory, hence a necessity for greater statutory provision. It may also be added that the creation

of a new State department, to be known as Surveyor General of the State of Indiana, who should stand at the head of all county surveyors, and whose duties it should be to keep all plats, notes, etc., from the earliest government surveys to the organization of a State, and be able to furnish extracts of the same to any county surveyor upon application for the same. This would greatly benefit each and all county surveyors of the State, and would directly or indirectly benefit the land owners of the same. Said office to take place of the land clerk of the State Auditor's office.

## RANDOM LINES.\*

R. I. MORRISON, C. E., KNIGHTSTOWN, IND.

GENTLEMAN—Had there been any ready method of computation of departures, suitable for work in the rules laid down in any of the text-books on surveying—in the manuals or engineers' pocket-books, in Molesworth, Haswell, Trautwine, Ny-trom or Burt's "Key to Solar Compass"—there might have been no occasion for the reading of this paper. With incomplete exceptions, such as the short rules and tables in Burt's "Key," published in 1854, and possibly others in manuals published since, which I have not seen, the subject of random lines has been left unnoticed. This is much as the books leave the truth in reference to triangles, viz: that the line between the middle points of any two sides of any plain triangle is parallel to the third side, and is equal in length to half of it. The reason why text-books have so carefully refrained from any mention of this fact was for a long time beyond my comprehension, for it is absurd to think geometers had never made note of it. About ten years ago I stumbled upon it and thought I had really found something. It has taken nearly all the years since for me to fully appreciate the utter insignificance of the discovery. They may have omitted to mention it because it was so extremely apparent that it would occur at once to the mind of every investigator! Be that as it may, let pupils who do not catch it at once be "bored for simples," if you choose; yet the fact remains that such an apology for failure to insert will not apply to the authors of the pocket-books mentioned, for insignificant items by the score swell out their volumes, and are welcome, in place, as entertaining or useful in assisting the memory to recall points almost forgotten. The county surveyor would, doubtless, also welcome instructive items relative to random lines.

For the purpose of assisting those surveyors who may not have given the subject so much attention; as an aid to tiresome mental work in the field, when tables may not be at hand; to remove the cause of much possible inaccuracy, and because of the failure of the published works to supply the need, have I ventured to furnish you with reliable and simple rules for field practice on random lines. I hope the older surveyors present will pardon me for demonstrating matters, as to the process of their formation, which they already so thoroughly understand.

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\*Omitted from Report of Proceedings of 1882.

The old text-books on surveying give the departure  $2\frac{1}{3}$  links, in distance of 80 chains (1 mile), for an angle of 1 minute; and it is now my purpose to show you what each member could readily show himself, to wit: How near  $2\frac{1}{3}$  links departure is to the absolute truth. "The radius of a circle being 1, the semi-circumference is known to be 3.14159265358979. This being divided by 180 and 60, or at once by 10,800, gives .0002908882086657 for the arc of 1 minute. Of so small an arc the sine, chord and arc differ almost imperceptibly from the ratio of equality." *Legendre.*

Now, in order to simplify the discussion, I shall here consider a link as if it were a single unit instead of only the hundredth part of the unit. The sine, then, for arc of 1 minute, for a chain distance, expressed in links, will be .02908882086657, and for 80 chains it will be 80 times that much, or 2.32710566932560.

2 $\frac{1}{3}$ links is.....	2.3333333333333
Natural sine arc, 1' for 1 mile, as above.....	2.32710566932560

The difference is..... .00622766400773

or, say  $\frac{6}{1000}$  of a link, or, .06 of a tenth of a link. This is nearly the sixteenth part of a tenth of a link, as the difference for each minute of angle in a distance of one mile. Up to 1°, however, or sixty times the above difference, the difference is less than four-tenths of a link, and it is found the carefully calculated tables of the books (the departures being given for but two places of decimals) that the departure for distance for 40 chains, and for angle 1°, does not vary in the slightest particulars from the departure worked out by the short method given below, the rule for which is made by assuming that  $2\frac{1}{3}$  links is the true sine of angle of 1 minute in 1 mile. It is therefore unnecessary to use the long-drawn-out fractions where simpler forms can be substituted without inaccuracy. If, then, the difference for 1° and 1 mile is four-tenths of a link, for 2° it would be eight-tenths link; therefore the short rules given below hold good for all angles up to 1° only. When angles are larger than 1° they pass out of the range of angles for ordinary random lines. Sometimes, however, in field work, larger ones are unexpectedly met with, and it is just here the importance to the surveyor of having at hand a ready method of computation becomes apparent. Such angles may be correctly and almost instantly computed up to 4° by general rules A and B.

*When Minutes of Angle are Given, to Find Links of Departure.*—If  $2\frac{1}{3}$  links be taken as the departure for 1 minute in 80 chains, for 40 chains there will be  $1\frac{1}{3}$  links, *i. e.*, 1 minute =  $1\frac{1}{3}$  links; therefore, the *Rules for 40 Chains.*—To the number of minutes add  $\frac{1}{3}$  to get number of links of departure. Good for all angles up to 60 minutes. [This rule I do not find anywhere, though it would be strange if it had not sooner been published.]

*General Rule (A).*—Multiply .0291 by given distance in chains and links, then multiply by given number of minutes to get number of links of departure. Good for all angles up to 240 minutes.

Example: The angle of two lines starting from the same point is 240 minutes: how far apart should they be in 100 chains?

Ans.:  $.0291 \times 100 \times 240 = 698$  links.

NOTE.—In cases where extreme accuracy is desired a proper allowance can be made for the difference in length of the random and the true line, equal to the versed sine of the included angle. In distance of 40 chains and angle of  $4^\circ$  it is  $9\frac{7.6}{100}$  links; *i. e.*, the true line will be  $9\frac{3}{4}$  links longer than the random line, if the right angle departure be projected from the latter line; if it be from the true line, however, the versed sine becomes subtractive from the measured distance. For  $3^\circ$  the versed sine, 40 chains distance, is  $5\frac{1}{2}$  links; for  $2^\circ$  it is  $2\frac{1}{2}$  links; while for  $1^\circ$  it is scarcely  $\frac{1}{2}$  of a link. I have fixed upon  $4^\circ$  as the highest limit of angle necessary to be considered in a treatise on random lines.

*Short Rules for Special Distance.*—Good for all angles up to 60 minutes.

For 40 chains—Add  $\frac{1}{6}$  to the number of minutes to get number of links of departure.

For 20 chains—Add  $\frac{1}{3}$  to the number of minutes and divide by 2 to get the number of links of departure.

For 10 chains—Add  $\frac{1}{6}$  to the number of minutes and divide by 4 to get the number of links of departure.

For 1 chain—Add  $\frac{1}{6}$  to the number of minutes and divide by 40 to get the number of links of departure.

*General Short Rules.*—Good for all angles up to 60 minutes.

Multiply the result obtained as above for 1 chain by any given distance in chains and links to get the number of links departure for such distance.

Example: Given distance 18.35 chs., angle 24 minutes; require links of departure?  
 Ans.  $24 \div 4 = 28$ ,  $\div 40 = 0.7$ ,  $\times 18.35 = 12.845$  links.

*When Links of Departure are Given, to Find Number of Minutes of Angle.*—In the equation  $1\frac{1}{6}$  links = 1 minute, the value of 1 link, expressed in minutes, must be obtained. Then if  $1\frac{1}{6}$  links =  $1'$ ,  $\frac{7}{6}$  lk. =  $1'$ , or  $\frac{1}{6}$  lk. =  $\frac{1}{7}'$  or  $\frac{6}{6}$  lk. =  $\frac{6}{7}'$ , *i. e.* 1 lk. =  $\frac{6}{7}'$ , or  $\frac{7}{6}$  lk. =  $\frac{6}{7}'$ , where both terms are in the same denomination. Hence the rule for 40 chains. From the number of links departure, subtract  $\frac{1}{7}$  to get number of minutes of angle. Good for all departures up to 70 links.

[This rule is given in Burts' "Key," without explanation of its formation. His limit is 200 links per mile.]

The general rule, which I do not find stated anywhere, is as follows, viz:

*General Rule (B).*—Multiply distance in chains and links by .0291, and divide product into the given number of links, to get the number of minutes of angle.

Good for all departures which do not produce angles greater than 240 minutes.  
 Example: The departure of two lines starting from the same point in a distance of 100 chains is 698 links. What is the angle?  
 Ans.  $.0291 \times 100 = 2.91$ ,  $698 \div 2.91 = 240'$ .

Reference to traverse table for distance, 100 and angle  $4^\circ$ , will show the correctness of general rules A and B in the examples given.

*Short Rules for Special Distance.*—Good for all departures which do not produce angles greater than 60 minutes.

For 40 chains—From links departure subtract  $\frac{1}{7}$  to get the number of minutes of angle.

For 20 chains—From 2 times links departure subtract  $\frac{1}{7}$  to get number of minutes of angle.

For 10 chains—From 4 times links departure subtract  $\frac{1}{7}$  to get number of minutes of angle.

For 1 chain—From 40 times links departure subtract  $\frac{1}{7}$  to get number of minutes of angle.

*General Short Rule.*—Good for all departures which do not produce angles greater than 60 minutes.

Obtain result for distance of 1 chain as above, and divide it by any given distance in chains and links, will get the number of minutes of angle.

Example: Given distance 30 chains, departure 21 links. What is the angle?

Ans.  $(21 \times 40) - \frac{1}{7} = 840 - 120 = 750, \div 30 = 24'$ .

From the rules here given, tables for instant reference can be constructed by any surveyor to any desired extent of completeness; or he can, without tables and without loss of time or danger of inaccuracy, make such computations in the field as will be necessary for any random line.



# DRAINAGE.

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BY W. A. OSMER.

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The subject which has been assigned me covers a broad expanse of time and territory. From the earliest works printed, and, in fact, the earliest known which alludes to the subject was printed in 1534, and called the "Book of Surveying and Improvement," in which the author points out as one of the great advantages of the husbandman the term "dychynge." But to pursue the theme down to the present day would be monotonous and uninteresting, yet I wish to mention the great disadvantages the husbandman of the old world labored under by having, after draining into receiving basins, to pump the water twelve to eighteen feet into more elevated marshes, where it might be conveyed to the sea. Think of the enormous cost. What would an Indiana farmer think of engaging in the pumping business to reclaim his wet lands? Yet here we are with the greater part of the wet lands of this State lying upon the highest ground, and with plenty of fall, and those same lands being the most fertile and productive, yet our farmers will grub along from year to year among bogs, stumps and stones. And should a more enterprising neighbor seek to reclaim portions of land and make them, with others, tillable, and have an equitable assessment of benefits made, some one at once seeks a lawyer and files a remonstrance, and, upon some technicality, arrests the legal process of having the ditch established, pays his attorney a fat fee, goes home happy and grubs among his stumps and bogs; pays his taxes upon his wet, unproductive land. Whereas, had he joined with his neighbor, aided in the work, added twenty or forty acres more to his tillable land, as the case may be, how much better off at the end of a term of years than he was by making a savings bank of a lawyer, from which no dollar ever returns.

There may be something in the fact of there being such a thing as the drain being inefficient, as many of them are. One in my own county which I recall, where a drain was established along a creek bottom, the creek in question having a dozen arms or tributaries. In the petition for the ditch only the lands adjoining were embraced, and the drain was made to reclaim only the lands in question; and from time to time persons owning land at the head of these various tributaries petitioned and had drains established emptying into this creek, and now there are over thirty miles in the eight different ditches emptying into this one, not one of

them, if any, of less capacity than the main one. Consequently, the main ditch, which was for a few months a great benefit, is now a damage; and they submit to it rather than seek a remedy, for fear of being enjoined or having remonstrances filed.

And again, about the time a person or a number of persons get ready or able to have a tract of wet land improved, a change is made in the ditching acts, and there is a chronic uncertainty about it. Before the people or the attorneys fairly become conversant or posted in the drainage law a new law has been passed, and there is a holding off from petitioning until some one tries it and ascertains that the law will hold water.

I believe the first drainage act was passed in 1852, authorizing persons to form an association, elect officers, employ an engineer and appoint appraisers, etc. This act was amended about a dozen times. In 1859 a similar act was passed. Another of about the same nature was passed in 1867, and another in 1873. And in none of these acts was there a clause governing the keeping of these drains open, free from obstructions and in good repair. In 1875 another act was passed, which was altogether different from any of the others (but which all of you are as familiar with as myself), which repealed several sections of the act of 1867, which act was ultimately repealed entirely in 1877.

Another act was passed somewhat like the old act of 1852. They were getting back to old principles again, and in 1879, another act something like the act of 1875; then came the two acts of 1881. The act authorizing county commissioners being almost identical with the act of 1875, and the other, authorizing the judge of the circuit court to appoint two drainage commissioners, and making the surveyor a commissioner, *ex officio*, who shall report to the judge of the court. The last named act being by far the most expeditious to accomplish the end desired, except it be in some counties where there be limited terms of court. Yet with one or two amendments, I believe it to be the best drainage act yet passed by our Legislature. I would suggest that it be so amended that a person may petition and the commissioners report either in the circuit or commissioners' court. By combining the best elements of the two acts now in force an act that would answer for several generations could be formed. Yet with a great number of our legislators, they must get a bill through somehow, and, of some, kind to suit his particular locality; hence the number of drainage bills.

I have been informed that one legislator, one of the present incumbents, has a bill to repeal all the ditching acts, on account of his being so unfortunate as to own several hundred acres of wet lands which had been assessed for draining. He certainly then did not come to legislate for his constituents, or for the commonwealth, but simply for himself and against them. For the general good of the people in respect to drainage less legislation would be better. Another has a bill to amend the circuit court act and have the drainage commissioner's fee fixed at one dollar and a half a day—an immense sum—expecting a man to travel into a remote part of the county, pay his car fare or take his horse, pay board for himself and animal from that munificent sum of \$1.50 per day. Could not that man be induced to cover four dollars and a half of his *per diem* into the State treasury? He would more likely be found voting himself \$10 a day additional for expenses paid on some jaunt to one of the State institutions.

It is within the power, and I believe the duty of the members of this body who are thoroughly conversant with the matter, to make timely suggestions to the committees of each of the branches of the Legislature. No one certainly understands the necessities, remedies or defects in the drainage laws better than the surveyor.

Several points suggest themselves, notably that of all persons interested in any drain of having notice when and where the viewers will meet, that they may be heard upon matters pertaining to the draining of their lands; many a suit at law may be avoided by that. Another, in the circuit court act only, which should provide for crediting a man to some extent, where he has partially constructed the drain upon his own land; and also should provide that where there is no natural arm or inlet extends on to a man's land, he should not be liable for assessment. In many cases persons are assessed upon lands lying somewhat remote, and have no outlet or natural channel leading to the ditch, but because the ground slopes toward the ditch he may forever be barred from making an artificial outlet through his neighbor in such cases, and his neighbor may even go so far as to erect barriers upon his land near the line of his neighbor, and prevent rains or floodwater from coming over on to him. In a case cited in Indiana Reports (I forget the number), a man had erected a barrier to turn floodwater, which came from an adjoining field and overflowed him, thereby turning the water back. The court held that where there was no well defined channel he was not liable for obstructing storm water, and say the obstruction, if surface water or an alteration in the flow of it, affords no cause of action in behalf of a person who may suffer loss or detriment therefrom against one who does not act inconsistent with the due exercise of dominion over his own soil; and it was declared that no action lay for the obstruction, and that waters percolating the soil or contained in hidden recesses, without a channel or course, surface water and waters overflowing from contiguous streams or rivers, fall within the maxim that a man's land extends from the center of the earth to the skies above, and such waters as fall in rain and snow on his land, or come thereon by surface draining from or over contiguous lands, he must keep within his boundaries or permit them to flow off without artificial interference, unless, within the limits of his own lands, he can turn them into a natural watercourse.

There are several points which suggest themselves to me whereby the present laws would be made better, but as we have a committee to make such suggestions I will not speak of them. In my experience in draining lands, which is not very large, I find, generally, much complaint about the former ditches; and these are varied in their nature. "A" says the ditch is too large; "B" says it is too small, and another says you don't give it enough fall. I judge as to the size of a ditch from indications upon the line as to the slope; generally make it one foot perpendicular to one foot horizontally, except in cutting through sandy ridges, where it should be made to slope one and one-half or two feet horizontally to one foot perpendicularly. All this must be governed by the character of the soil; and it is not for me to say or prescribe methods for those whose experience has been greater than mine.

As to the grade or fall of courses, the surface of the ground must govern that principally. I find that uniform grades, made as long as the surface will permit,

are the best. After making my profile I seek to lay the grades in as long lines as possible. Short grades tend to fill up the ditch. I have suggested, and I think a plan will be adopted, for draining a tract of about 800 acres, by taking it in another direction than the one formed by nature. The tract in question is being ditched at present, but with such little fall as will not secure perfect drainage; but, by cutting through a sand ridge thirteen feet deep, an average fall of over six feet to the mile can be had; and I propose to lay two thirty-inch stone or vitrified clay pipes through the sand ridge a distance of four hundred feet, which will always be kept free and require no cleaning out, and will not destroy the use of that part of the ground. In many instances the natural channels are not located so as to attain the greatest advantages in draining large tracts of land, and in many cases short cut-offs through higher ground shorten the ditch and gives a better fall to the 100 feet. I will not attempt to instruct you in the various methods, as many of you have had more experience than myself, and will close.

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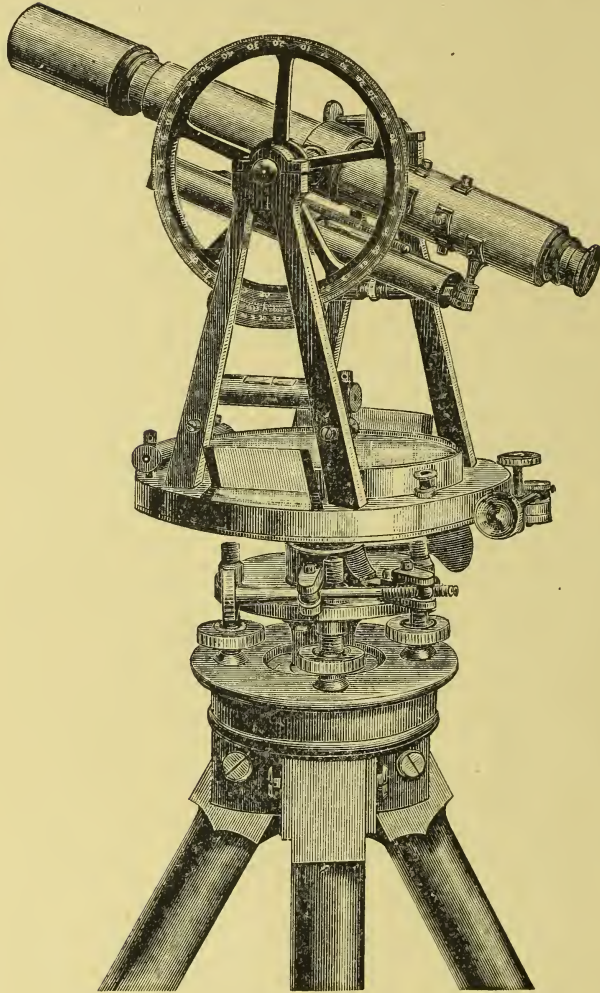


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